

The Quarterly Hail

National Weather Service - Hastings, Nebraska

Volume 3, Issue 2

Notes From the Meteorologist In Charge

Normally this time of year we would find ourselves in the busiest time of year for tornadoes and severe thunderstorm activity. The staff is all trained and standing ready to get the warning out when those events occur. Of course, Mother Nature seems to have different plans in store for us so far this year! In the weather business you grow accustomed to adjusting to whatever she doles out and you learn to roll with the punches. Last year at this time we had already dealt with over 20 tornadoes; this year we are dealing with issuing warnings for large hail while the temperature is 26 degrees! The moral is, be prepared for anything!

There are over 150 years of combined forecasting experience in this office and none of us can remember weather remotely similar to the spring we have experienced to date. What does this mean in terms of the rest of severe weather season? Who knows?! The pattern is changeable and quite a challenge to forecast more than 2 or 3 days out at this point. With that in mind, I can only urge you to be ever vigilant and prepared for whatever weather is thrown at us.

We have made a few changes to our warning program and recently had the dual polarization upgrade to our radar. We are adjusting to the changes and are eager to put these conversions to use to provide even better services and products. I would be neglect in reminding you that even though we have had an abnormally cool spring, summer heat will be on us quickly. Please be thinking about the effects of that heat.

Through all this, the agency is struggling with the severe budget cuts, more commonly referred to as "sequestration". We are working hard to make the impacts of these very deep cuts as minimal as possible. One adjustment may be to limit the mailed copies of this newsletter for the remainder of the fiscal year (September 30, 2013). If we must take this action in the future, we will let you know as soon as we can. The office budget has been slashed to almost nothing and hiring and travel have been frozen. This means we are operating on a budget shoestring. I promise you, my staff and I will continue to strive to provide the best possible service through these tough times.

So please sit back and enjoy the rest of the newsletter. As usual, the staff has put a lot of time and effort into the publication of this document! As always, we recognize that many of you sacrifice for our mission to serve your community and nation. We thank you for your volunteerism!

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Special Points of Interest:

- Learn about Impact Based Warnings and what they mean for you!
- Want to submit precipitation types to the weather service?
- What is a Landspout?
- Interested in some weather history?

Employee Spotlight - Briona Saltzman, Meteorological Intern

Like my coworkers, my interest in weather began at a very young age. Growing up in western Missouri, I got to experience all types of weather, including major winter storms/blizzards and ice storms to fierce tornadoes and thunderstorms. I remember quite vividly waking up to the sound of wind blowing and my parents telling us to huddle in the closet with blankets over our head (as we didn't have a basement). I also remember winters where our back yard was like an ice skating rink and it was impossible to walk around. In the 3rd grade I did a project on weather, complete with a paper mache tornado and a miniature model farm. My interest in weather peaked again in high school, when my church youth group travelled to Stockton, MO in May 2003 to help with the clean up after a devastating EF-3 tornado demolished the city.



To be honest, I didn't know that weather was even a possibility for a career. I didn't even know the National Weather Service (NWS) existed until I was in college. I started college at Missouri State University in Springfield, MO in hopes of going into Agriculture, Engineering or Architecture. It wasn't until I took an Introduction to Atmospheric Science class that I began to think about the NWS as a career. The rest, as they say, is history. I transferred to the University of Missouri Columbia and got my Bachelors of Science Degree in Atmospheric Science in May of 2010. I was able to take a student position with the Arkansas-Red Basin River Forecast Center in Tulsa, OK, where I learned all about hydrology and forecasting river flooding. Soon after I graduated, I accepted the position I have today, as a meteorologist intern, here in Hastings.

When I'm not at work, I enjoy spending time with friends and family. I've been married to my husband Chris for almost 2 years now, although we've known each other since elementary school. We like to ride bikes, go to movies or go exploring. I've recently taken up sewing and crafts as a hobby which also keep me pretty busy.

A Weather History "Did You Know?" - Julia Berg, General Forecaster

To have a tornado hit your town is a devastating event. To have one hit your town two times is a little odd, but to have tornados devastate your town and nearby farms three times is even worse. Add this for effect: this happened three years in a row, and on the same day of the year! May 20th became known as "Cyclone Day" in Codell, Kansas after tornadoes hit the area in 1916, 1917 and 1918.

In 1916, the tornado tracked across Rooks and Osborne Counties from just south of Codell to 3 miles east of Codell. 1917 brought a powerful F-3 tornado which moved northeast from 12 miles southwest of Plainville, Kansas, passing 2 miles west of Codell, to 4 miles east of Plainville. The tornado was a multiple vortex tornado and was reported as "an immense cone with a diameter of 2 miles." As it passed near a ranch on the Saline River, a house lost an upper story, while a smaller house was scattered to the north for 2 miles, leaving the foundation nearly empty. Barns were destroyed on a half dozen farms.

By 1918, people were wondering what the odds were that there would be a third year in a row with a May 20^{th} tornado. Like clockwork, the beginnings of a monstrous F-4 tornado set down 3 miles south of Ellis, Kansas and tracked northeast through Codell to northwest of Bloomington. The half-mile wide, three-county tornado leveled farm houses and barns. Five people were killed in the same home that had been hit the previous year. Many buildings were blown apart in Codell, but no people were killed in town. After leaving Codell, the storm intensified, leveling farms and killing a mother and baby 2 miles northeast of town and another baby 6 miles northeast of town. About 30 farms were destroyed in Osborne County. Around 11 p.m. another tornado touched down on the southeast edge of Plainville, Kansas, striking two farms and destroying one barn.

What Is A Landspout? - Rick Ewald, Science and Operations Officer

Landspouts - what are they and how to they differ from other tornadoes? First and foremost, a landspout is a tornado since it meets the definition of a violently rotating column of air, in contact with the surface, pendant from a cumuliform cloud. Landspouts can form anywhere, but are more common in certain locations such as the Front Range of the Rocky Mountains. This is due to cooler air rushing down the mountains and colliding with hot dry air off the High Plains, creating an area of opposing winds at the ground.

A landspout is slang used by storm chasers for a type of non-supercell tornado. The majority of tornadoes are spawned from supercell tornadoes. A supercell is a convective storm that possesses a deep, persistent mesocyclone. In simple terms, you have a deep rotating updraft that lasts for a while. The scale of the mesocyclone is typically 2 to 6 miles in diameter.

Non-supercell tornadoes, such as landspouts, form a little differently. Circulation starts near the ground, along some

This landspout touched down on March 19th

This landspout touched down on March 19th approximately 3 miles south of Shelton.

Photo courtesy of Les Forney.

type of boundary such as a land or sea breeze, dry line, or a wind shift line. If the air is unstable, i.e. hot at the surface and cooler aloft, the circulation tilts and rises in the unstable air. As it rises into a developing cumulus cloud, the updraft is stretched, contracting the axis of rotation, and causing the column of air to spin faster. A popular way to visualize this is the example of a figure skater who begins a spin with their arms out. As they pull their arms in and over their head, they decrease the axis of rotation, and spin faster and faster.

In the case of the landspout, most of the rotation is confined to the lower few thousand feet (from the ground to the base of the cloud). Compare this to a supercell where the rotation extends well into the cloud level, perhaps 20 or 30 thousand feet high. When comparing the strength of rotation, think of a supercell as a rotating drum, such as a washing machine, while a landspout is more like stirring some chocolate into a glass of milk with a spoon. You end up with a much stronger and deeper rotating column of air with a supercell. This is why tornadoes spawned from supercells tend to be more intense and longer lasting than those from non-supercells.

That doesn't mean landspouts are harmless. As with any tornado, flying debris from intense winds can cause serious injury or death to those who do not take shelter. It is also important to note landspouts are more difficult to detect on radar due to the smaller circulation which is closer to the ground. Thus these types of tornadoes often strike with very little or no advance warning.

Come See Us At The Nebraska State Fair!

The Hastings NWS Office will once again be hosting a booth at the 2013 Nebraska State Fair in Grand Island, Nebraska! Our booth will feature a Van de Graff generator, live radar, giveaways, drawings and information about weather safety. You can probably pick up a Tootsie Roll or two.



Be sure to stop by and say "Hello" - we will be happy to chat with you and answer any questions you may have! The state fair will be held from August 23rd - September 2nd.



Weather Word Scramble

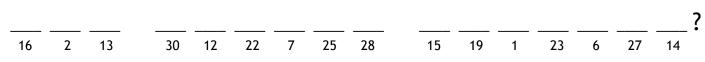
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We hope you can answer "YES!" to the question below!

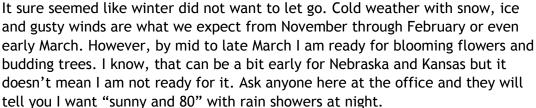


Answers can be found on page 7!



Notes from MOM (Mind of Marla) - Marla Doxey, Data Acquisition Program Manager





By now we should be able to put the tube and funnel back in our rain gauges. Those of you with the recording gauges, you can put the funnel back in the upper housing, otherwise we will put it back in when we come around and get the units ready for summer.

A couple of reminders for summer time reporting; while sprinkles usually don't amount to anything that can be measured, they are reported as a trace (T). Heavy dew is not considered precipitation. Precipitation has to fall from the clouds. Also, hail is NOT considered snowfall. However, it is considered snow depth if you still have a majority of your ground covered at the time of observation. While this is rare, it is not unheard of. When you have hail, please remember to put the size in Remarks. This is very helpful. Hail size should relate to a coin (penny, nickel, dime, etc) or ball (tennis, baseball, softball). Just do not use marble as there are several different sizes of marbles. If you know what time it hailed, that information would be useful as well along with any damage caused by strong winds.

Observer news: Mark Buettner, our observer south of Spalding has retired and will be moving. We hate to see him and his family leave, but we know they will enjoy retirement and being closer to family members. Mark took care of one of our recording rain gauges for 25 years. Thank you so much for your service Mark.

We would like to welcome Bill, Melanie and Duane Campbell of Central City to our Cooperative Observer family. They have taken over the temperature and precipitation readings from Duane Henk. Duane was a wonderful observer for over 15 years. We will miss him; he sure was a trooper as he held on until we found an adequate replacement. A big thank you to Duane.

With the ongoing budget shortfalls, I am not sure if we will get out to visit all of you this year. We may end up visiting some of our sites every other year. Please do not hesitate to contact us at any time if you are in need of something or have a question.

COOP Awards

The National Weather Service proudly presented Dan Frerichs with a 30-year length of service award. Mr. Frerichs has been the official Cooperative Weather Observer for the National Weather Service near Gothenburg, Nebraska since 1982. Each afternoon, Mr. Frerichs faithfully measures and records the amount of precipitation, as well as the high and low temperatures that occur during a 24-hour period. The data is then recorded and mailed to the Weather Service at the end of each month. Climate data is used in every aspect of our national economy, including insurance companies, agriculture, water resources and many more. Thanks to Mr. Frerichs for his continued dedication and sacrifice to the Cooperative Observer Program.



Dan Frerichs (right) receives his award from Hydrometeorological Technician, Mike Reed.

NWS Changes Warning Wording - Mike Moritz, Warning Coordination Meteorologist

In the last decade or so, major tornado outbreaks in places like Oklahoma City, Birmingham and Joplin have shown no location is safe from the potential deadly wrath of Mother Nature. Such events underscore the need for all of us to understand the warning information and take actions to protect ourselves and our families. In support of this, the NWS has made some changes to the severe weather warning information we provide to our partners, customers and the general population at large.

The changes are called "Impact Based Warnings" and were borne from a pilot project in Missouri, Oklahoma and Kansas in 2012. After months of feedback,



impact of this tornado?

study and independent verification, not just by meteorologists, but also social scientists, the NWS has added more succinct "impact" information to Tornado and Severe Thunderstorm Warnings. Though most of us don't actually read a Tornado Warning or Severe Thunderstorm Warning, we do hear them via TV and radio stations, or NOAA All-Hazards Weather Radio. You will hear these changes this severe weather season.

All warnings issued now include "hazard", "source" and "impact" information designed to focus us all quickly on the main threat from a particular event. The following is an example of this from a Severe Thunderstorm Warning issued for Rooks County, KS on April 7 of this year:

Hazard...Quarter size hail and 60 mph wind gusts.

Source...Radar indicated

Impact...Hail damage to vehicles and crops is expected. Expect wind damage to roofs...siding and trees

In the example above, the hazards of "quarter size hail and 60 mph wind gusts" are clearly defined. The potential impacts are outlined so anyone in the path of the storm should understand just what MAY happen.

The following is another example, this time from a Tornado Warning issued for a part of central Kansas in April, 2012:

Hazard...Damaging tornado and golf ball size hail

Source...Weather spotters confirmed tornado

Impact...Significant house and building damage possible. Mobile homes completely destroyed if hit. Some trees uprooted or snapped. Vehicles will likely be thrown by tornadic winds.

In this example, it is very clear a "damaging tornado" has been "confirmed" by spotters. There is no ambiguity in that fact. Though NWS meteorologists can't necessarily predict the strength of the tornado while it's ongoing, we can give some insight into the possible damage you might expect, largely based upon the eyewitness reports in the field. In this case, the phrase "mobile homes completely destroyed if hit" is designed to convey to residents in mobile homes they should go to a tornado shelter immediately or risk potential injury from the destruction of their home.

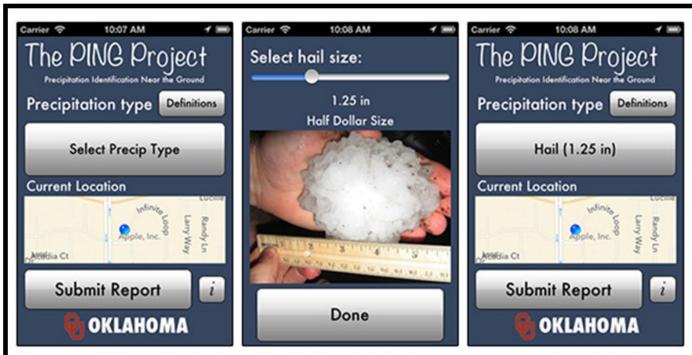
There are many different combinations of "impacts" you will hear this year, based upon the size of the hail, strength of the wind and the potential for damage with a tornado. Remember, it's OUR job as meteorologists to tell you when severe weather is coming. It is YOUR job to understand the hazardous risk and take the appropriate action needed given the situation. Look and listen for these "Impact Based Warning" changes in the coming months.

Technology To Aid Storm Reports - Mike Moritz, Warning Coordination Meteorologist

Did you ever want to report what type of precipitation was falling at your location? If you have a tablet or smartphone, you (or anyone) can do just that.

The National Severe Storms Laboratory and University of Oklahoma have teamed to offer a free tablet/smartphone app which allows you to report the type of precipitation falling, no matter your location. The app is called the Precipitation Identification Near the Ground project or "PING". This simple app gives you the opportunity to report any type of precipitation (hail, snow, sleet, etc.) and automatically sends and plots the information based upon your GPS location. The report you provide is viewed in near real-time by meteorologists at the NWS Hastings office and is used in research to improve computer processing of radar data. If you report hail during a thunderstorm, you can even report how big the hail was, therefore directly assisting NWS meteorologists during severe weather.

Every one of the reports we receive about the weather is valuable. The app is FREE and available at the Apple iTunes Store or at the Google Play Store. Just search "mPING", download it and give it a try.



The new mPING app for Apple and Android mobile devices lets users report rain, hail, sleet and snow to NOAA's National Severe Storms Laboratory. Weather researchers there will compare these citizen scientist reports to local radar images -- radars have a tough time seeing precipitation near the ground. The results are expected to lead to new radar technologies and techniques to determine the type of precipitation falling at ground level.

Credit: NOAA

Answers To Weather Word Scramble

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cloud - thermometer - rain - winter - thunder - snow - hail - blizzard - summer - sleet - humidity - lightning - flood - warning - radar - temperature - weather - drought - drizzle - watch - tornado - advisory - froot - windy - sun - freeze - front - ice - spring - fall - barometer
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What A Difference A Year Can Make! - Ryan Pfannkuch, General Forecaster

Large year-to-year temperature variations are just one example of why Central Plains weather and climate is so fascinating. The tables on this page help render "statistical proof" to this claim, as they demonstrate the large contrast between this March-April and March-April 2012. In 2012, most of the area notched its warmest or 2nd-warmest March on record, with all three of

March	2012 Mean Temperature	2012 Departure from Normal	2013 Mean Temperature	2013 Departure From Normal
Ord	50.9	+13.2	33.4	-4.3
Grand Island	54.1	+14.7	36.1	-3.3
Hastings	53.3	+13.4	36.3	-3.6
Kearney	52.9	+15.2	36.7	-1.0
Cambridge	50.1	+10.6	36.4	-3.1
York	52.0	+14.3	32.9	-4.8
Hebron	53.1	+13.0	34.4	-5.7
Smith Center, KS	54.4	+12.8	37.1	-4.5

the Nebraska Tri-Cities finishing in the top spot. Focusing on Grand Island, March 2012 beat the previous record-warmest March from way back in 1910 by 1.4°, helped along by exceeding 70° fifteen times and exceeding 80° on six days. It was a totally different story this year, as average March readings across most of the area ended up 3-5° below normal, and 16-19° colder than last year. At Grand Island, only three days this March exceeded 70° and zero days reached 80°.

Turning to the April comparison, although April 2012 was not as anomalously warm as March 2012 across the 30-county area it still registered 3-6° above normal in most locales, warm enough to notch Grand Island and Hastings its 7th and 10th-warmest April on record, respectively. At Grand Island, daily high temperatures never once fell short of 50° and low temperatures only dropped below freezing (32°) three times. This year, continuing the colder-than-normal trend from March, most of the area averaged 4-6° below normal, and 9-11° colder than last April. At Grand Island and Hastings, this April registered as the 13th and 6th-coldest on record, respectively, and the coldest since 1997. For at least a few observation sites across the area, including Cambridge and Osceola, this was in fact the coldest April on record. At Grand Island this April, high temperatures failed to reach 50° on 12 days, and 18 days featured low temperatures of 32° or colder, the 3rd-most on record out of 118 years. Needless to say, the spring growing season got off to a considerably later start this year versus last year.

April	2012 Mean Temperature	2012 Departure from Normal	2013 Mean Temperature	2013 Departure From Normal
Ord	51.9	+3.1	42.7	-6.1
Grand Island	56.2	+5.6	46.1	-4.5
Hastings	55.5	+4.8	45.3	-5.4
Kearney	55.4	+6.7	44.9	-3.8
Cambridge	54.3	+4.6	44.4	-5.3
York	55.2	+4.9	44.1	-6.2
Hebron	56.5	+5.5	45.8	-5.2
Smith Center, KS	57.5	+5.0	46.4	-6.1

Hand-in-hand with the dramatic temperature differences, snowfall also varied considerably between spring 2012 and 2013. In March-April 2012, no sites within the area reported measurable snowfall. This year, however, the majority of the area measured at least 4-10" during this same time, highlighted by 11.6" of March snow at Burr Oak KS and 7" of April snow at Ord and Belgrade NE.

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This Table Reflects Various Historical Summer Extremes Across The Local Area...

	Coolest June Daytime Max Temperature	Coolest July Daytime Max Temperature	Coolest August Daytime Max Temperature	Driest Summer (June-Aug)	Wettest Summer (June-Aug)
Grand Island	49° on 6/4/1945	60° on 7/1/1988	57° on 8/31/1935	2.37" in 2012	21.79" in 1908
Hastings	50° on 6/4/1945	61° on 7/24/2004	59° on 8/27/1914	4.34" in 1922	23.95" in 1915
Kearney	48° on 6/4/1998	60° on 7/13/1951	55° on 8/28/1935	3.51" in 1934	23.24" in 1915
Hebron	52° on 6/5/1945	61° on 7/1/1988	57° on 8/28/1935	2.35" in 1934	28.57" in 1908
Loup City	46° on 6/4/1998	60° on 7/12/1951	59° on 8/27/1992	1.34" in 2012 (Ord)	22.94" in 1905
Alton KS	50° on 6/4/1998	65° on 7/2/1995	62° on 8/11/1997	2.56" in 1913	33.47" in 1993
Plainville, KS	48° on 6/4/1998	58° on 7/2/1995	58° on 8/15/1979	2.57" in 1913	27.74" in 1993

Summer Climate Outlook Detailed Below...

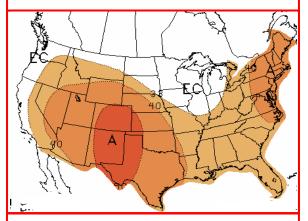
The latest Summer Outlook from the Climate Prediction Center favors above normal temperatures and slightly favors below normal precipitation for most all of South Central Nebraska and North Central Kansas.

<u>Time Frame</u>: The NWS considers the "summer" season to be all of June, July and August. Although this differs somewhat from the astronomical summer season, using these three full calendar months is convenient for calculating meteorological data.

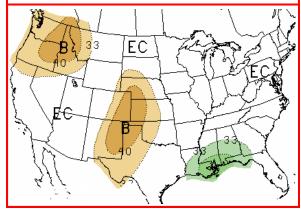
<u>Temperature</u>: The outlook on the right reflects a forecast for the <u>3-month period as a whole</u>. We tend to view temperatures in the context of a daily or monthly average, but the 3-month outlook accounts for the entire season. Red/Orange colors represent "warmer" than normal and <u>Blue</u> colors represent "cooler" than normal. The white area labeled "EC" designates regions with Equal Chances of having above, near or below normal temperatures. This means there is no clear trend in the forecast analysis to support one of these outcomes over another. As the image shows, the outlook for South Central Nebraska and North Central Kansas depicts a 40-50% chance of realizing above normal summer temperatures. However, the outlook doesn't indicate how much above normal the seasonal temperature might be.

<u>Precipitation</u>: Similar to temperatures, the precipitation outlook depicts the total precipitation for the entire 3-month period, and is independent of individual days or months. Green colors represent "wetter" than normal and brown colors represent "drier" than normal. The white area labeled "EC" designates regions with Equal Chances of having above, near or below normal precipitation. This means there is no clear trend in the forecast analysis to support one of these outcomes over another. As the image shows, south central Nebraska and north central Kansas have a 33 to 40% chance of receiving LESS than normal precipitation (i.e., drier than normal). Like the temperature outlook, this outlook does not forecast how much above (below) normal precipitation might be.

Temperature Outlook for Summer 2013 (June-August)



Precipitation Outlook for Summer 2013 (June-August)



To view these and other Climate Prediction Center outlooks visit http://www.cpc.ncep.noaa.gov/

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